CLMPTO-07/02/04
KH-07/30/04

1. – 5. (Canceled)

6. (Currently Amended) An optical head device comprising:

a first light source for emitting a light beam of a first wavelength;

a second light source which emits a light beam of a second wavelength differing from said first wavelength;

a single block wherein the first and second light sources are aligned thereon;

an objective lens for causing the light beams from said first light source and second light source to converge on an optical disk;

a diffraction grating having first and second surfaces;

[[a]] the first surface of the diffraction grating ~~which has~~ having a first-order diffraction efficiency of almost zero for the light beam forwarded from said first light source and [[emits]] emitting the first-order diffraction light for the light beam forwarded from said second light source; and

[[a]] the second surface of the diffraction grating [[which]] being designed to realize a differential push-pull method of sensing a tracking error sense signal; ~~emits the first-order diffraction light for the light beam forwarded from said first light source and has a first-order diffraction efficiency of almost zero for the light beam forwarded from said second light source;~~

wherein the first and second surfaces of the diffraction grating ~~gratings~~ do not diffract returned light from a recording medium.

7. (Currently Amended) The optical head device according to claim 6, wherein the depth h01 of the grating groove of said first surface of the diffraction grating is expressed by

$$h01 = m1 \cdot \lambda 1/(n1 - 1) \text{ and}$$

the depth h02 of the grating groove of said second surface of the diffraction grating is expressed by

$h02 = m2 \cdot \lambda 2/(n2 - 1)$

where n1 is the refractive index of said first surface of the diffraction grating, n2 is the refractive index of said second surface of the diffraction grating, λ 1 is the wavelength of said first light source, λ 2 is the wavelength of said second light source, and m1 and m2 are natural numbers.

8. (Original) The optical head device according to claim 7, wherein at least one of said m1 and m2 is 1.

9. (Original) The optical head device according to any one of claims 6, 7 and 8, wherein said first diffraction grating and said second diffraction grating are formed integrally on a substrate.

10. – 17. (Canceled)

18. (Currently Amended) An optical head device comprising:

a first light source for emitting a first light beam of a first wavelength;

a second light source, which is placed at almost the same position as that of the first light source, emitting a second light beam of a second wavelength differing from said first [[light]] wavelength;

a single block wherein the first and second light beams ~~source~~ are aligned thereon;

a recording medium having tracks; and

an objective lens for causing the light beams from said first light source and second light source to converge on the recording medium,

wherein the objective lens, the first light source and the second light source are disposed such that the optical axis of the beam of light of a shorter wavelength of said first light source coincides with the optical axis of said objective lens, and the optical axis of the beams of light of a longer wavelength of said second light source is slanted from the optical axis of said objective lens. ~~the position of the optical axis of said objective lens is disposed at least between the optical axes of beams of said first and second light sources, and the optical axis of said objective lens coincides with the optical axis of the beam of light of a shorter wavelength, or disposed nearer to the position of the optical axis of the beam of light of a shorter wavelength than to the beam of light of a longer wavelength.~~

19. (Currently Amended) The optical head device according to claim 18, wherein said recording medium includes a first disk to be read from when said first light source is used and a second disk to be read from when said second light source is used and satisfies the following expressions;

t1 (DVD) < t2 (CD)

~~δ 1 (DVD) < δ 2 (CD)~~

where t1 is the substrate thickness of the first disk[[,]] and t2 is the substrate thickness of the second disk~~, δ 1 is the distance between the optical axis of said first light source and that of said objective lens, and δ 2 is the distance between the optical axis of said second light source and that of said objective lens~~.

20. – 21. (Canceled)

22. (Currently Amended) ~~The optical head device according to claim 21,~~ An optical head device comprising:

a first light source for emitting a light beam of a first wavelength;

a second light source which emits a light beam of a second wavelength differing from said first wavelength;

a single block wherein the first and second light sources are aligned thereon;

an objective lens for causing the light from said first or second light sources to converge on an optical disk; and

a hologram for diffracting the light reflected from said optical disk and returned through said objective lens and directing the reflected light to a light-receiving element,

wherein, if the distance between the center of said hologram and the optical axis of said first light source is δ 1 and the distance between the center of said hologram and the optical axis of said second light source is δ 2 in a projection plane in the direction of the optical axis of said objective lens, the equation δ 1 = δ 2 is almost satisfied.

23. (Currently Amended) ~~The optical head device according to claim 21,~~ An optical head device comprising:

a first light source for emitting a light beam of a first wavelength;

a second light source which emits a light beam of a second wavelength differing from said first wavelength;

a single block wherein the first and second light sources are aligned thereon;

an objective lens for causing the laser light from said first or second light source to converge on an optical disk; and

a hologram for diffracting the light reflected from said optical disk and returned through said objective lens and directing the reflected light to a light-receiving element,

wherein, if the distance between the center of said hologram and the optical axis of said first light source is $\delta 1$ and the distance between the center of said hologram and the optical axis of said second light source is $\delta 2$ in a projection plane in the direction of the optical axis of said objective lens, the expression $\delta 1 < \delta 2$ is almost satisfied.

24. (Canceled)

25. (Original) An optical head device comprising:

a first light source for emitting a light beam of a first wavelength;

a second light source which emits a light beam of a second wavelength differing from said first wavelength;

a single block wherein the first and second light sources are aligned thereon;

an objective lens for causing the laser light from said first or second light source to converge on an optical disk; and

a hologram for diffracting the light reflected from said optical disk and returned through said objective lens and directing the reflected light to a light-receiving element, wherein if the distance between said first light source and said second light source is δ, the distance between said first and second light sources and said hologram is in the range from 20δ to 40δ.

26. (Original) The optical head device according to claim 25, wherein said hologram is a nonpolarization hologram.

27. (Original) An optical head device comprising:

a first light source for emitting a light beam of a first wavelength;

a second light source which emits a light beam of a second wavelength differing from said first wavelength;

a single block wherein the first and second light sources are aligned thereon;

an objective lens for causing the laser light from said first or second light source to converge on an optical disk; and

a hologram for diffracting the light reflected from said optical disk and returned through said objective lens and directing the reflected light to a light-receiving element, wherein

said hologram has a first marker attached to the projected position in the direction of the optical axis of said second light source, the first marker serving as a mark in installing said hologram.

28. (Original) An optical head device comprising:

a first light source for emitting a light beam of a first wavelength;

a second light source which emits a light beam of a second wavelength differing from said first wavelength;

a single block wherein the first and second light sources are aligned thereon;

an objective lens for causing the laser light from said first or second light source to converge on an optical disk; and

a hologram for diffracting the light reflected from said optical disk and returned through said objective lens and directing the reflected light to a light-receiving element, wherein

said hologram has a first marker attached to the position of the midpoint between the projected position in the direction of the optical axis of said first light source and the projected position in the direction of the optical axis of said second light source, the first marker serving as a mark in installing said hologram.

29. (Previously Presented) The optical head device according to any one of claims 27 and 28, wherein, if the numerical aperture when the light beam from said first light source is used is NA1 and the numerical aperture when the light beam from said second light source is used is NA2, the expression NA1 > NA2 is satisfied.

30. (Original) The optical head device according to any one of claims 27 and 28, wherein said hologram has a second marker attached to the position corresponding to an optical axis extending to any point on said light-receiving element.

31. (Original) The optical head device according to claim 30, wherein said any point is the center of said light-receiving element.

32. (Original) The optical head device according to claim 30, wherein said any point is the marker provided on said light-receiving element.

33. (Currently Amended) A disk drive system comprising:

a first light source for emitting a light beam of a first wavelength;

a second light source which emits a light beam of a second wavelength differing from said first wavelength;

a single block wherein the first and second light sources are aligned thereon;

an objective lens for causing the light beams from said first light source and second light source to converge on an optical disk;

a hologram for diffracting the light reflected from said optical disk and returned through said objective lens and directing the reflected light to a light-receiving element;

a diffraction grating which is placed on the optical path between said first light source and the hologram and on the optical path between said second light source and the hologram, one surface of [[and]] which produces almost 100% of the 0-order diffraction light for the light beam forwarded from said first light source and has a first-order diffraction efficiency of almost zero and emits the 0-order and first-order diffraction light for the light beam forwarded from said second light source, and the other surface of which is designed to realize a differential push-pull method of sensing a tracking error sense signal; and

a signal processing circuit which processes the photoelectric conversion output from said light-receiving element and subjects the photoelectric conversion output of the reflected light corresponding to said first-order diffraction light to a tracking error process and obtains a signal playback output and/or a tracking error signal by phase sensing for the photoelectric conversion output of the reflected light corresponding to the 0-order diffraction light.

34. (New) The optical head device according to claim 22, wherein said hologram is constructed and arranged to sense a shift in focus by a mixed aberration method.

35. (New) The optical head device according to claim 23, wherein said hologram is constructed and arranged to sense a shift in focus by a mixed aberration method.